

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 July 2003 (24.07.2003)

PCT

(10) International Publication Number
WO 2003/060541 A3

(51) International Patent Classification⁷: **G01S 5/02, 1/04**

(74) Agent: **MITTLER, Enrico**; Mittler & C. s.r.l., Viale Lombardia, 20, I-20131 Milano (IT).

(21) International Application Number:

PCT/EP2003/000349

(22) International Filing Date: 15 January 2003 (15.01.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

MI2002A 000088 18 January 2002 (18.01.2002) IT

(71) Applicant (for all designated States except US): **CONSORZIO POLITECNICO INNOVAZIONE** [IT/IT]; Via Fucini, 2, I-20133 Milano (IT).

(72) Inventor; and

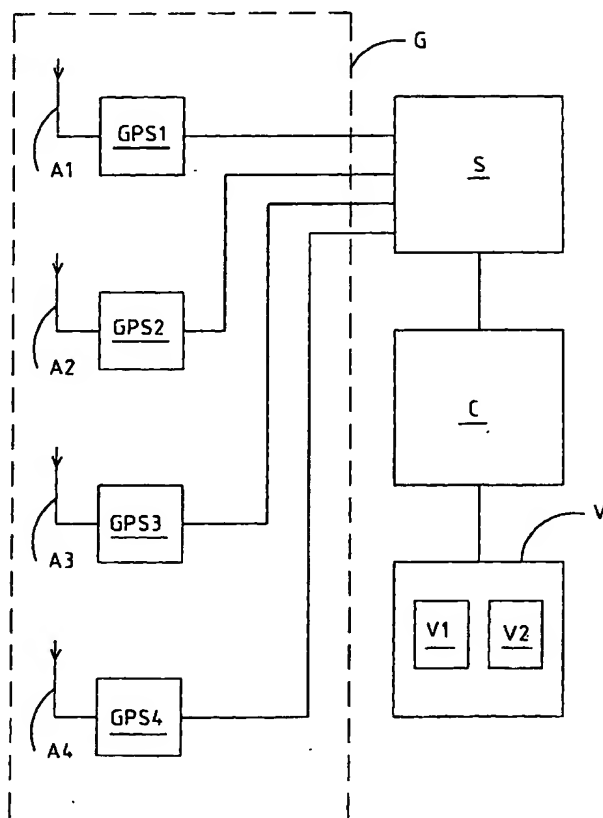
(75) Inventor/Applicant (for US only): **BARAZZETTI, Alessandro** [IT/IT]; Via Magenta, 21, 22100 Como (IT).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: **AIRCRAFT GPS INSTRUMENTATION SYSTEM AND RELATIVE METHOD**



(57) Abstract: The present invention refers to an instrumentation system of an aircraft by means of GPS (Global Positioning System). In particular, it refers to a modular instrumentation system for aircraft, preferably airplanes, based on the GPS, and to the relative method. In one embodiment the modular instrumentation system for aircraft comprises: four antennas (A1-A4) connected to four GPS receivers (GPS1-GPS4) that supply in output the attitude data and the angular velocities; a data acquisition card (S, C) that receives, memorizes and processes said attitude data and said angular velocities coming from said data acquisition card (S, C) and supplies data relating to the board instruments of an aircraft; visualization means (V) of said data relating to the board instruments.



Declarations under Rule 4.17:

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US*
- *of inventorship (Rule 4.17(iv)) for US only*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *with international search report*

(88) Date of publication of the international search report:

11 March 2004

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/00349

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01S5/02 G01S1/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GRAAS VAN F ET AL: "GPS INTERFEROMETRIC ATTITUDE AND HEADING DETERMINATION: INITIAL FLIGHT TEST RESULTS" NAVIGATION, INSTITUTE OF NAVIGATION, WASHINGTON, DC, US, vol. 38, no. 4, 1 December 1991 (1991-12-01), pages 297-316, XP000195769 ISSN: 0028-1522 abstract page 304, last paragraph -page 307, paragraph 4	1-5, 10
Y	EP 0 908 806 A (LORAL SPACE SYSTEMS INC) 14 April 1999 (1999-04-14) abstract paragraph '0010! - paragraph '0011! paragraph '0024!	1-5, 10

-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

*** Special categories of cited documents:**

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

16 July 2003

Date of mailing of the international search report

29/07/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Roost, J

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/00349

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 99 03000 A (MASSACHUSETTS INST TECHNOLOGY ; DEYST JOHN J (US); HANSMAN R JOHN () 21 January 1999 (1999-01-21) abstract page 4, line 1 -page 7, line 8 page 17, line 9 -page 20, line 14 ---</p>	<p>1-4, 7-10,12</p>
A	<p>"Development of a Real-Time Attitude System Using a Quaternion Parameterization and Non-Dedicated GPS Receivers" DEPARTMENT OF GEOMATICS ENGINEERING, UNIVERSITY OF CALGARY, 'Online! July 1996 (1996-07), XP002247909 Calgary, Canada Retrieved from the Internet: <URL:http://www.geomatics.ucalgary.ca/Pape rs/Thesis/GL/96.20096.JSchleppe.pdf> 'retrieved on 2003-07-16! page iii: ABSTRACT pages 85-96: Chapter 6: Attitude System Design and Implementation ---</p>	<p>1,10</p>
A	<p>US 6 256 583 B1 (SUTTON ERIC) 3 July 2001 (2001-07-03) abstract column 1, line 1 -column 2, line 2 ---</p>	<p>1,10,11</p>
A	<p>HALL C E JR: "A Real-Time Linux system for autonomous navigation and flight attitude control of an uninhabited aerial vehicle" 20TH DASC. 20TH DIGITAL AVIONICS SYSTEMS CONFERENCE (CAT. NO.01CH37219), 20TH DASC. 20TH DIGITAL AVIONICS SYSTEMS CONFERENCE. PROCEEDINGS, DAYTONA BEACH, FL, USA, 14-18 OCT. 2001, pages 1.A.1-1-9 vol.1, XP002247910 2001, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-7034-1 the whole document -----</p>	<p>6-8</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/00349

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0908806	A	14-04-1999	US 6101430 A	08-08-2000
			EP 0908806 A2	14-04-1999
			JP 11190770 A	13-07-1999
WO 9903000	A	21-01-1999	WO 9903000 A1	21-01-1999
			US 6389333 B1	14-05-2002
US 6256583	B1	03-07-2001	NONE	